

Lowering the Cost of PM2.5 Compliance with a New Design Wet Membrane ESP

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Summary

Proposed restrictions on PM2.5 emissions can be costly for utilities and industry to implement without new particulate collection technologies. Primary PM2.5 is difficult to capture in present dry electrostatic precipitators due to poor charging of fine particles and particulate re-entrainment. Secondary PM2.5, usually in the form of SO3 mist, is virtually impossible to collect via dry precipitation. Wet precipitators, with high specific power, can play a greater role in control of PM2.5, since they are well suited to collection of acid gases and fine particulates, and virtually eliminate re-entrainment. However, power disruptions due to spraying (misting) of water, formation of dry spots, and corrosion of the collector surfaces limit the application of current wet precipitator designs.

This new technology, utilizing membranes as collecting electrodes, can dramatically improve existing wet, dry and "hybrid" precipitators. Capillary action within the membrane facilitates water-based cleaning and transports to maintain an even distribution of water over the fabric, overcoming many of the problems of existing wet precipitators.

This paper presents results of lab scale testing at Ohio University and pilot scale testing at Southern Environmental Inc. of membrane enhanced wet electrostatic precipitation. The results indicate that membrane collecting surfaces made from novel, low cost, corrosion-resistant materials can be completely cleaned via low velocity (and flow) water while maintaining the charging corona under all operational conditions, with collection efficiencies comparable to "typical" WESP's.

Use of these membranes provides a high efficiency, lower cost alternative to existing precipitator designs to meet increasingly more stringent particulate emission requirements. Further, as the membranes are based on lower cost materials, there is the distinct possibility for improved collection of fine particulates at lower costs compared to the alternative existing technologies.